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SMALL ENTITY COMPLIANCE GUIDE

Amendment of the Commission's Rules Regarding Directional AM Antenna Arrays

FCC 17-119

MB Docket No. 13-249

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This Guide is prepared in accordance with the requirements of Section 212 of the Small Business Regulatory Enforcement Fairness Act of 1996. It is intended to help small entities—small businesses, small organizations (non-profits), and small governmental jurisdictions—comply with the revised rules adopted in the above-referenced Federal Communications Commission (FCC or Commission) rulemaking dockets. This Guide is not intended to replace or supersede these rules, but to facilitate compliance with the rules. Although we have attempted to cover all parts of the rules that might be especially important to small entities, the coverage may not be exhaustive. This Guide cannot anticipate all situations in which the rules apply. Furthermore, the Commission retains the discretion to adopt case-by-case approaches, where appropriate, that may differ from this Guide. Any decision regarding a particular small entity will be based on the statute and any relevant rules.

In any civil or administrative action against a small entity for a violation of rules, the content of the Small Entity Compliance Guide may be considered as evidence of the reasonableness or appropriateness of proposed fines, penalties or damages. Interested parties are free to file comments regarding this Guide and the appropriateness of its application to a particular situation. The FCC will then consider whether the recommendations or interpretations in the Guide are appropriate in that situation. The FCC may decide to revise this Guide without public notice to reflect changes in the FCC's approach to implementing a rule, or it may clarify or update the text of the Guide. Direct your comments and recommendations, or calls for further assistance, to the FCC's Consumer Center:

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I. OBJECTIVES OF THE PROCEEDING

1. In this *Third Report and Order* in MB Docket 13-249, *Revitalization of the AM Radio Service*, the Commission amended or eliminated certain rules, in order to decrease technical and economic burdens on AM broadcasters using directional antenna arrays. Almost 40 percent of all AM broadcasters use directional antenna arrays for at least part of each broadcast day. Such arrays are more technically complex than non-directional AM transmission systems, and the rules for certifying and maintaining the antenna patterns can cause broadcasters substantial costs, both in terms of hiring engineers to perform the measurements necessary to comply with the rules, and in terms of lost broadcast time while transmission equipment is disconnected in order to perform required tests.
2. Specifically, in the *Third Report and Order* the Commission (a) amended 47 CFR § 73.154, to require field strength measurements only on radials that contain monitor points when performing partial proofs of performance; (b) eliminated mandatory periodic recertification of directional arrays licensed using Method of Moments (MoM) proofs of performance under 47 CFR § 73.155,¹ except as to system components that have been repaired or replaced; (c) eliminated the requirement of new reference field strength measurements for subsequent AM licenses submitted for directional antenna systems using MoM proofs, under 47 CFR § 73.151(c)(3); (d) exempted from the requirement to obtain a surveyor's certification any directional antenna pattern on any frequency using towers that are part of an authorized AM array, as long as the array is not physically altered or augmented, under 47 CFR § 73.151(c)(1)(ix); (e) clarified that 47 CFR § 73.151(c)(1)(viii), applies only when total capacitance used to model base region effects exceeds 250 picofarads (pF) and when base current sampling is used;² (f) amended 47 CFR § 73.151(c)(1) to clarify that a new MoM proof of performance is not required when tower or system components above the tower base are added or modified that do not affect the modeled values used in the license proof; and (g) eliminated the requirement, contained in the conditions to some AM stations' construction permits, that applicants employing top-loading antennas make current distribution measurements, instead permitting use of MoM to determine antenna characteristics.
3. The rule amendments in this *Third Report and Order* will reduce the burdens on AM broadcasters who are in many cases required to use technically complex directional antenna arrays in order to avoid interference with other AM stations.

II. COMPLIANCE REQUIREMENTS

4. The *Third Report and Order* modifies some of the rules governing the construction and siting of directional AM antenna arrays, and in the testing and proof of performance of radiation emitted from such directional arrays, as found in 47 CFR §§ 73.151(c)(1), 73.151(c)(3), 73.154(a), and 73.155, as well as certain requirements imposed as conditions in AM station construction permits.

A. Modify Partial Proof of Performance Rules (47 CFR § 73.154(a))

- Under the amended rule, broadcasters performing a proof of performance on an AM antenna array need only make field strength measurements on those radials containing a monitoring point, even if there are fewer than four monitored radials.³

¹ MoM modeling allows broadcasters to verify the performance of directional AM antenna systems through computer modeling based on internal system measurements and physical models of the antenna system, as opposed to sending engineers into the field to take field strength measurements.

² A farad is a unit of electrical capacitance; a picofarad (pF) is equal to one trillionth of a farad. Base current sampling is measuring the amount of current, or the flow of electric charge, at the base of an AM tower.

³ A “radial” in this context refers to an imaginary line extending from the transmitter site. Radials are identified by compass headings expressed in degrees, starting with 0 degrees (north) and proceeding in a clockwise direction from

- This is a change from the previous rule, which required field strength measurements on radials adjacent to monitored radials when there were fewer than four monitored radials.

B. Modify recertification measurements requirements and procedures for directional AM antenna arrays licensed with an antenna pattern pursuant to a Method of Moments (MoM) proof of performance (47 CFR § 73.155)

- Discontinues the requirement that directional AM antenna arrays licensed pursuant to a MoM proof of performance be re-certified at least once within every 24-month period, including disconnection and calibration of base sampling devices.
- Instead, recertification shall be required only in the case of repair to or replacement of affected system components, and then only as to the repaired or replaced components.
- Any recertification of repaired or replaced system component(s) shall be conducted on such component(s) in the same manner as an initial certification of the component(s), under the procedures set forth in 47 CFR § 73.151(c)(2)(i).

C. Modify the requirement for reference field strength measurements for directional AM antenna arrays licensed with an antenna pattern pursuant to a MoM proof of performance (47 CFR § 73.151(c)(3))

- Applicants filing an initial AM station license application for a directional antenna system based on computer modeling and sample system verification (i.e., MoM), will still be required to submit reference field strength measurements.⁴
- However, subsequent license applications for the same directional antenna system and physical facilities will not require submission of new reference field strength measurements, which were required under the previous rule.

D. Modify the requirement for surveying existing directional antenna arrays when applying for a directional antenna array using MoM modeling (47 CFR § 73.151(c)(1)(ix))

- The previous rule required that a station applying for a directional antenna pattern using MoM modeling to confirm the antenna pattern must obtain a post-construction certificate from a licensed surveyor, verifying that the towers in the antenna array have the proper spacing and orientation.
- The rule as amended deletes the requirement of a surveyor's certificate for any directional antenna pattern on any frequency on an already-authorized antenna array, providing that the tower geometry (spacing and orientation) are not changed, and no new towers are added to the array. The rule was amended because it was deemed unnecessary to put the broadcaster

0 degrees through 360 degrees. For example, the 90-degree radial indicates a line extending to the east from the transmitter site. A “monitoring point” is an accessible location for a field strength measurement on a null radial (radial of least radiation) or a radial in a significant direction of pattern radiation, used to determine whether the antenna system is operating properly.

⁴ See *supra* note 1. As stated above, MoM modeling involves computer modeling of an AM directional array and internal system measurements rather than field strength measurements. The model can be verified by re-taking the internal system measurements used with the computer model. “Reference field strength measurements” are the required initial measurements of the field intensity of the station, made on null and main lobes. A minimum of three measurements are required along each null and main lobe.

to the expense of having a surveyor confirm the locations of towers in a tower array in which no towers had been moved nor any towers added.

E. Clarify 47 CFR § 73.151(c)(1)(viii)

- The Commission clarifies that 47 CFR § 73.151(c)(1)(viii) applies only when the total capacitance used to model base region effects exceeds 250 pF, and only when base current sampling is used.

F. Change MoM rules with regard to re-proofing when antennas are added to towers (47 CFR § 73.151(c)(1))

- An AM station that verified the performance of its directional antenna system using computer modeling and sampling system verification (MoM), and that makes modifications to tower or system components above the base insulator (for example, adding an FM antenna to a tower, or changing guy wire insulators), shall follow the procedures set forth in 47 CFR § 1.30003(b)(2).
- The procedures in 47 CFR § 1.30003(b)(2), which by their terms apply only to the addition of an antenna to a tower in an AM antenna system, thus now apply to any modifications to tower or system components above the base insulator.
- These procedures require that the station making the change to a tower in an AM antenna array make a base impedance measurement on the tower being modified,⁵ and shall retain the result of the new tower impedance measurement in the station's records.
- The procedures further require that, if the new measured base resistance and reactance values of the affected tower differ by more than ± 2 ohms and ± 4 percent from the corresponding modeled resistance and reactance values contained in the last MoM proof, then the station shall file FCC Form 302-AM. The Form 302-AM shall be accompanied by the new impedance measurements for the modified tower and a new MoM model for each pattern in which the modified tower is a radiating element.

G. Eliminate the requirement for current distribution measurements for certain antenna configurations when MoM modeling is used

- Previously, the Audio Division staff attached a condition to a construction permit for an AM station requiring current distribution measurements to be made when the AM station applicant proposed to employ a top-loaded antenna.⁶
- This requirement has been eliminated. The Commission agreed with commenters who stated that current distribution measurements are unreliable and difficult to analyze, and that MoM analysis of the current distribution prior to tower construction provides an accurate means to determine the required physical length of the top loading wires, eliminating the requirement to modify the length after the tower has been erected. This condition will thus no longer be attached to AM station construction permits, and no such measurements shall be required.

⁵ A base impedance measurement is a measurement made at the base of an AM tower to determine the resistance and reactance at the tower input.

⁶ A current distribution measurement is a measure of the current strength along the tower as the resistance and reactance varies.

III. RECORDKEEPING AND REPORTING REQUIREMENTS

5. The Commission's actions in the *Third Report and Order* did not create any new recordkeeping or reporting requirements.

IV. IMPLEMENTATION DATE

6. The following rule in the *Third Report and Order* became effective 30 days after publication of the text or summary thereof in the *Federal Register*, i.e., on December 4, 2017: 47 CFR § 73.151(c)(1)(viii).

7. The following rules in the *Third Report and Order* require approval by the Office of Management and Budget (OMB) under the Paperwork Reduction Act: 47 CFR § 73.151(c)(1)(ix), 47 CFR § 73.151(c)(1)(x), 47 CFR § 73.151(c)(3), 47 CFR § 73.154(a), and 47 CFR § 73.15547. These rules shall become effective after the Commission publishes a notice in the *Federal Register* announcing OMB approval and the relevant effective date.

V. INTERNET LINKS

A copy of the *Third Report and Order*, is available at:

https://apps.fcc.gov/edocs_public/attachmatch/FCC-17-119A1_Rcd.pdf

A copy of the Federal Register Summary of the *Third Report and Order* is available at:

<https://www.federalregister.gov/documents/2017/11/03/2017-23908/revitalization-of-the-am-radio-service>